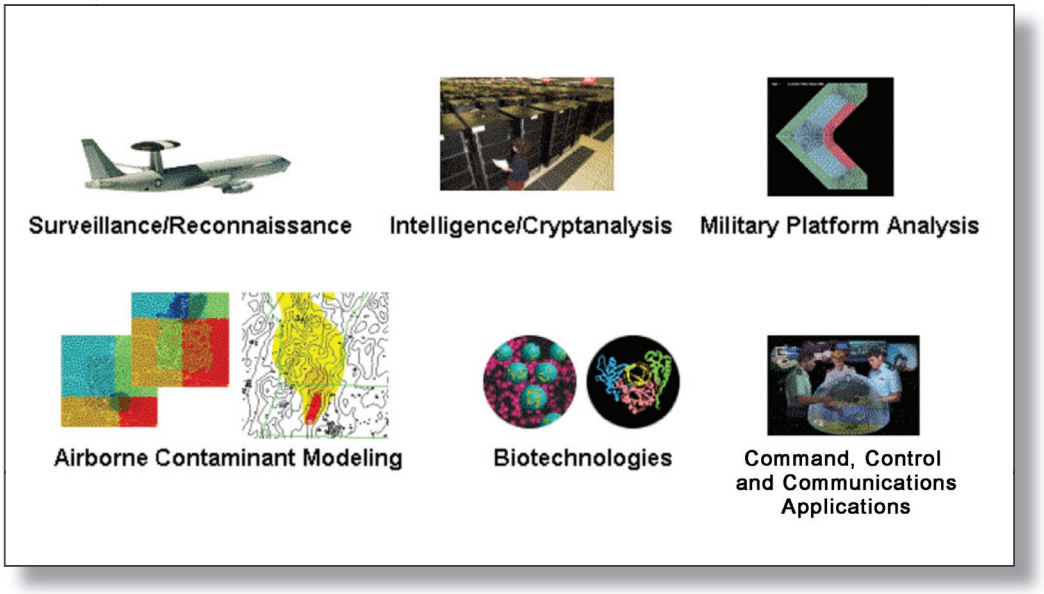
Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

HIGH-PRODUCTIVITY COMPUTING SYSTEMS



Recent Department of Defense (DoD) studies indicate a national security requirement for high-productivity computing systems (HPCS). For DoD, revolutionary change in HPCS means making supercomputing resources easier to use and easier to program. It means accessing large data repositories located around the world and merging scientific computing with pervasive computing on the battlefield.

HPCS requires ever-present multiple levels of security, autonomous systems management, and the application of real-world requirements to the challenges of HPCS to make everything work. The Information Directorate, serving in its role as the Air Force member of the review panel, will provide transition opportunities and challenge problems.

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Accomplishment

The Defense Advanced Research Projects Agency (DARPA)-sponsored HPCS program is a three-phase program scheduled to extend to 2010. Current Phase 1 tasks include industry research and development (R&D), technology component development, and application analysis and performance assessment of a broad spectrum of potential HPCS applications.

The challenge for industry R&D is to develop a productive system with the ability to double in value every 18 months (Moore's Law) over the next 2 decades. Throughout this task, DoD operational and research software applications will serve as the requirements driver for architecture and software research and systems assessment. DARPA and the directorate envision industry adoption of the architectures as a central strategy to ensure cost-effective solutions are available to the national security community.

The major technology areas requiring development in support of the next generation of productivity systems are system architecture, programming models, software technology, and hardware technology. This task demands an industry whole system perspective.

It is vital that researchers analyze a broad spectrum of potential HPCS applications to extract the key HPCS system design characteristics, parameters, constraints, and programming environments. Researchers are currently studying applications that include operational weather and ocean forecasting; planning exercises related to analysis of the dispersion of airborne contaminants; cryptanalysis; military platform analysis; survivability/stealth design; intelligence/surveillance/reconnaissance systems; virtual manufacturing/failure analysis of large aircraft, ships, and structures; emerging biotechnologies; and command, control, and communications applications.

Background

The HPCS program will provide DoD with significant technology and capability advancements for the national security and industrial user communities by filling a high-end computing gap that exists between today's HPCS, based on late 1980s technology, and the promise of quantum computing. The end product will be economically viable computing systems with both scalable vector and commodity system functionality for the national security as well as commercial, research, and industrial user communities.

Information
Emerging Technologies

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-IF-05)